CMPT 373
Software Development Methods

Building Software

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Some materials from Shlomi Fish & Kitware

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Just getting something to compile in a repeatable way can be nontrivial

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- It is the foundation of getting anything done.

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- You should at least ask yourself:
  - What tools do you use?
  - What workflow?
  - What benefits do you get?
  - What are the painful points?
  - Why haven't you made them less painful?

Build Systems

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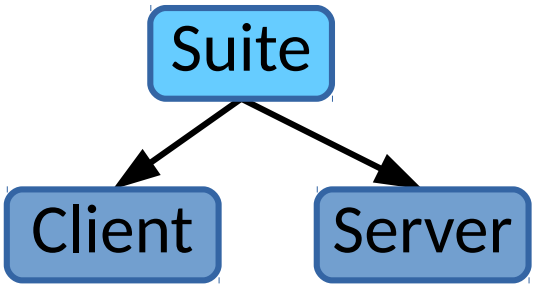
different programs



Build Systems

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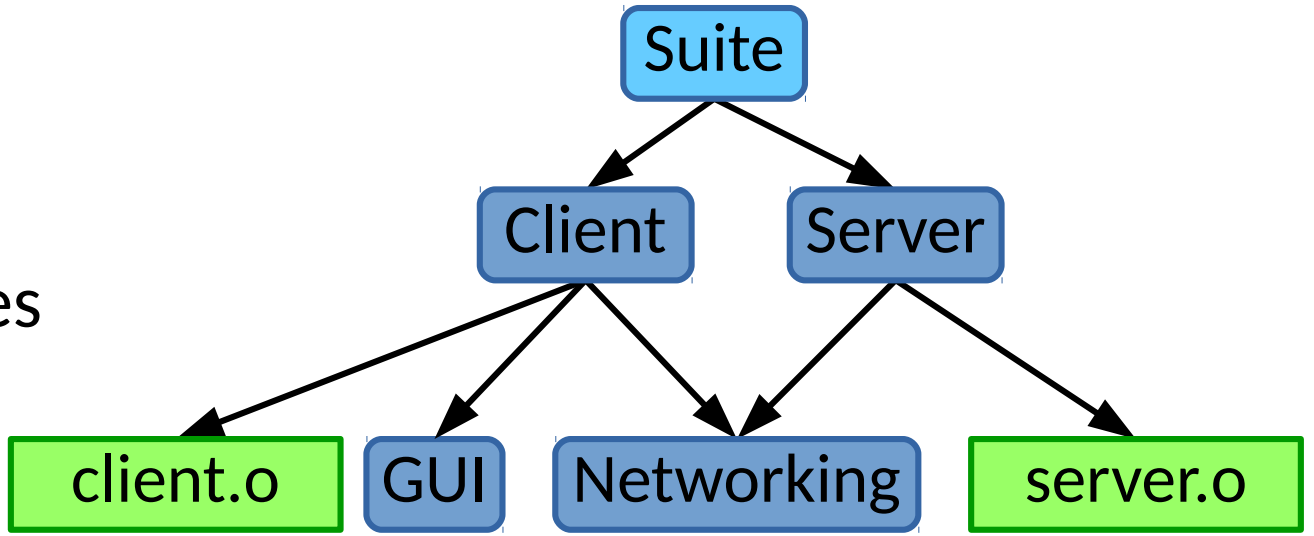

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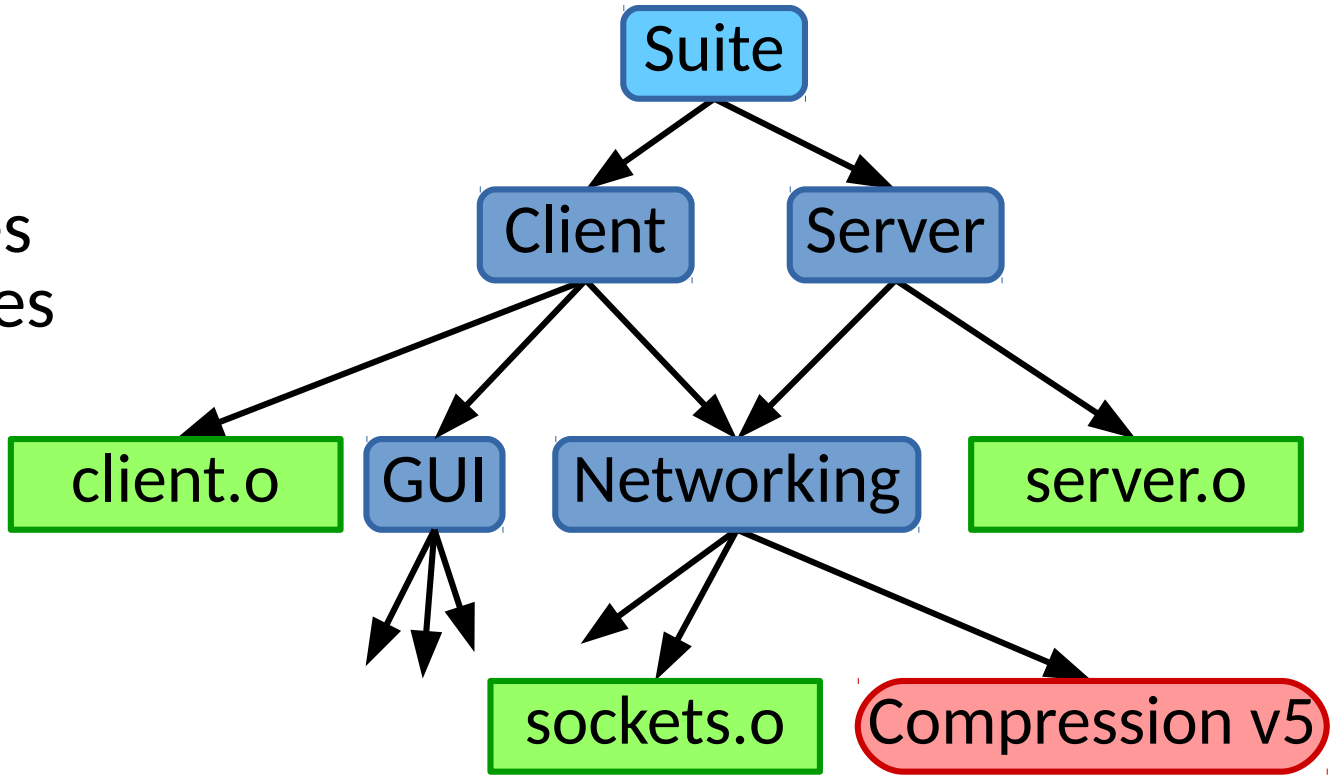

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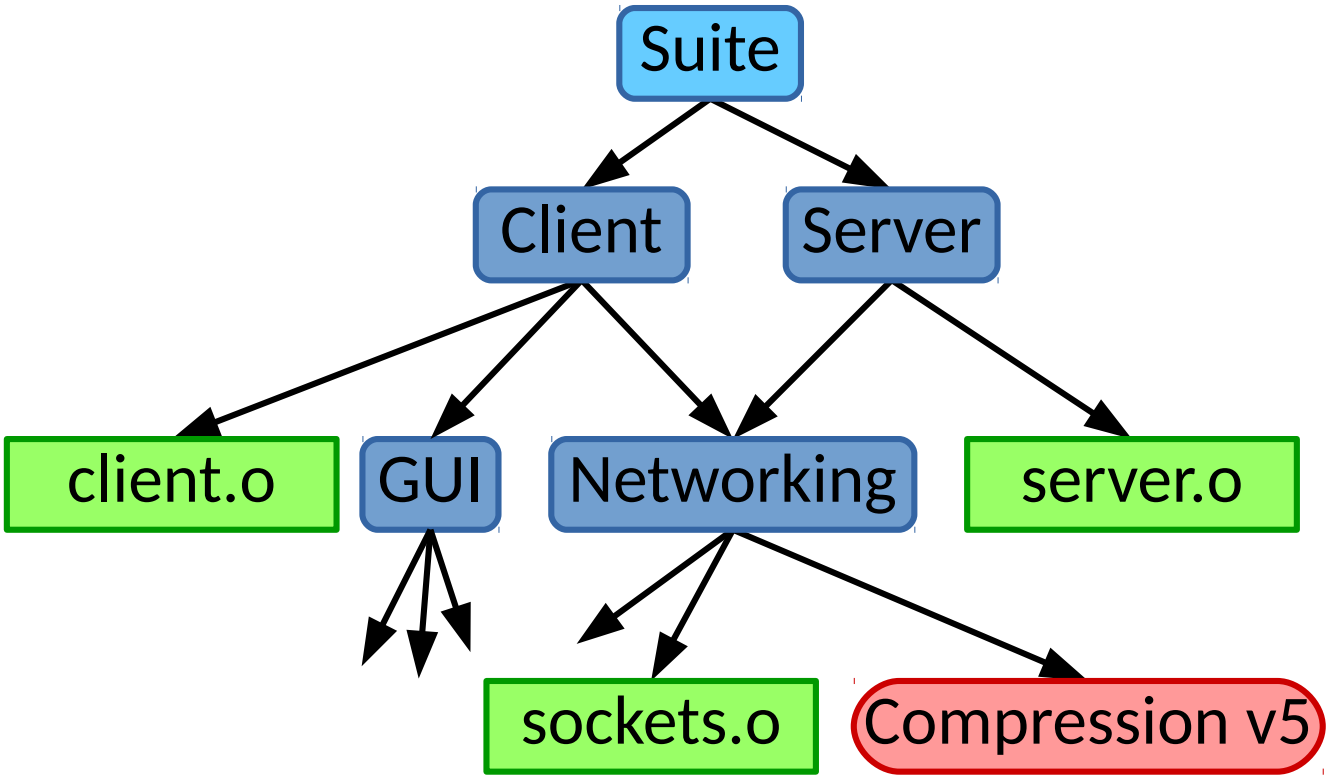

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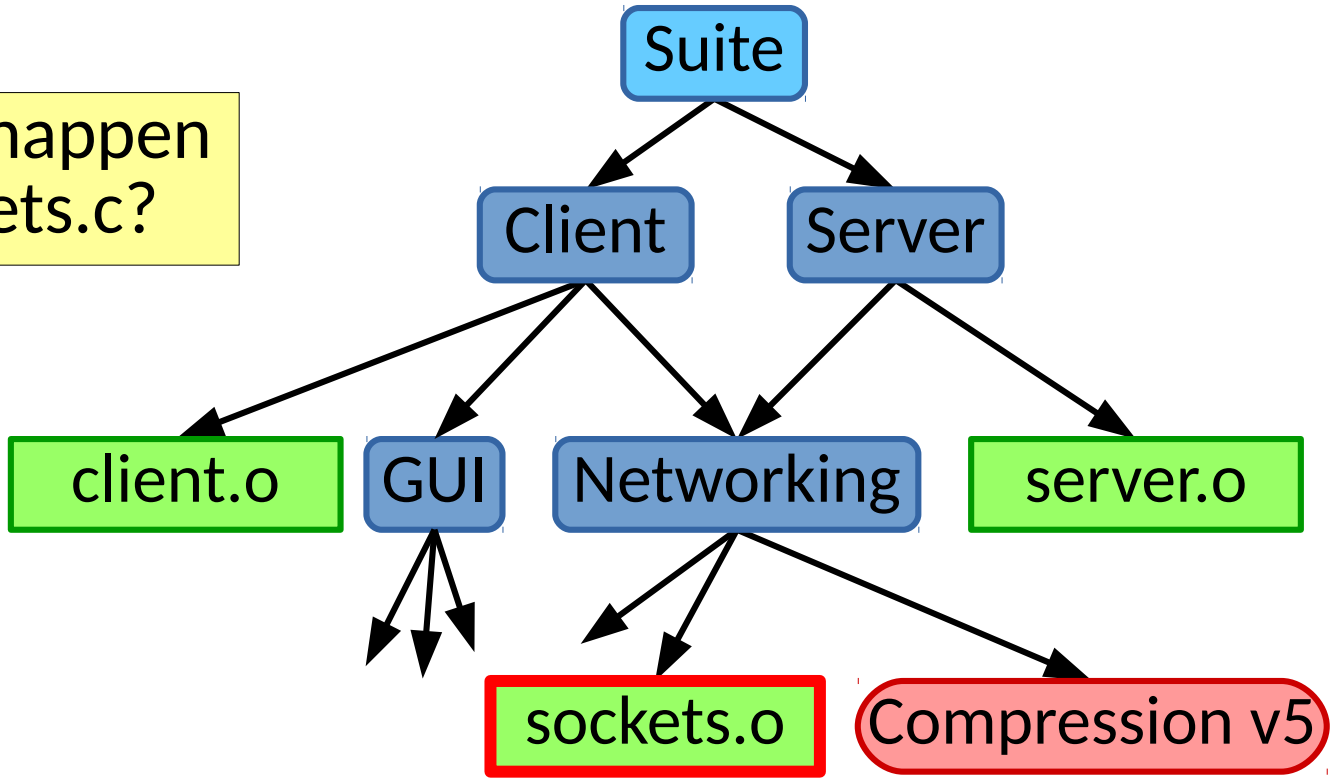
What do we want to happen after changing sockets.c?



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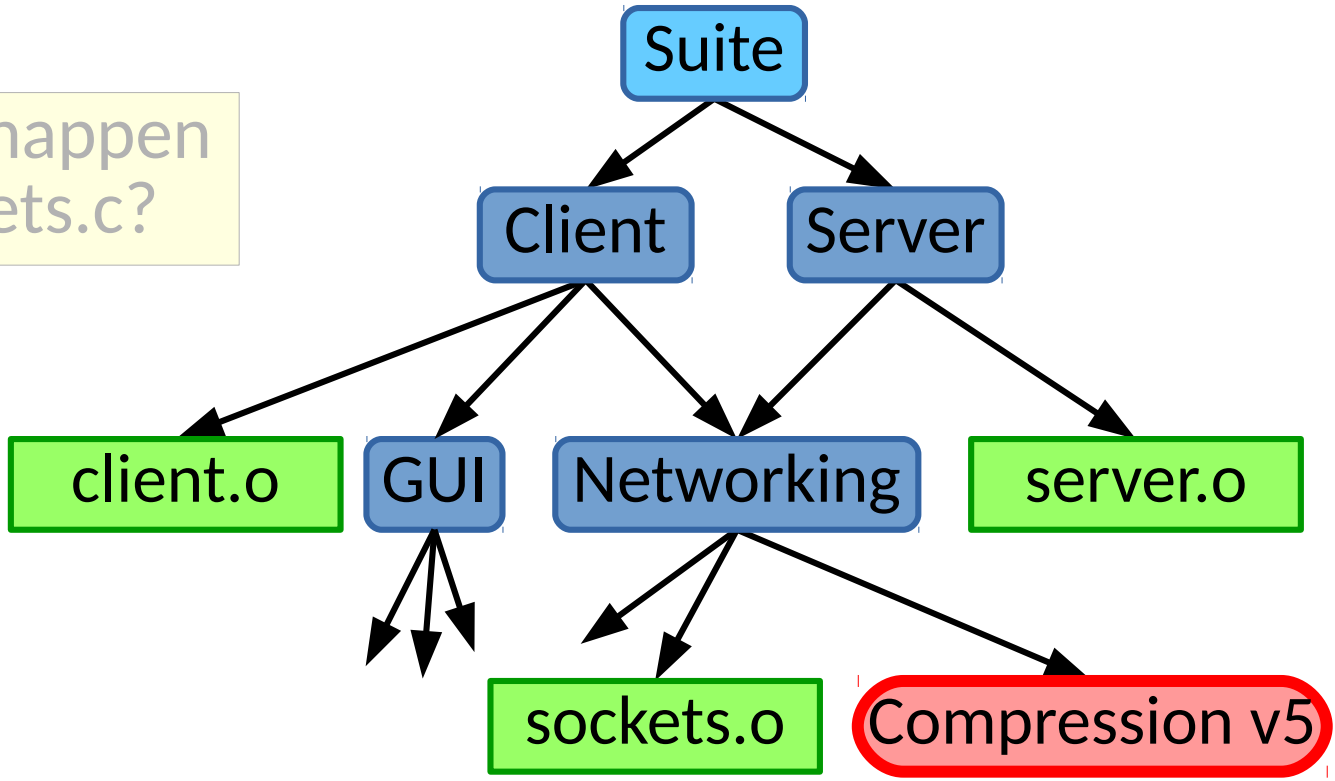

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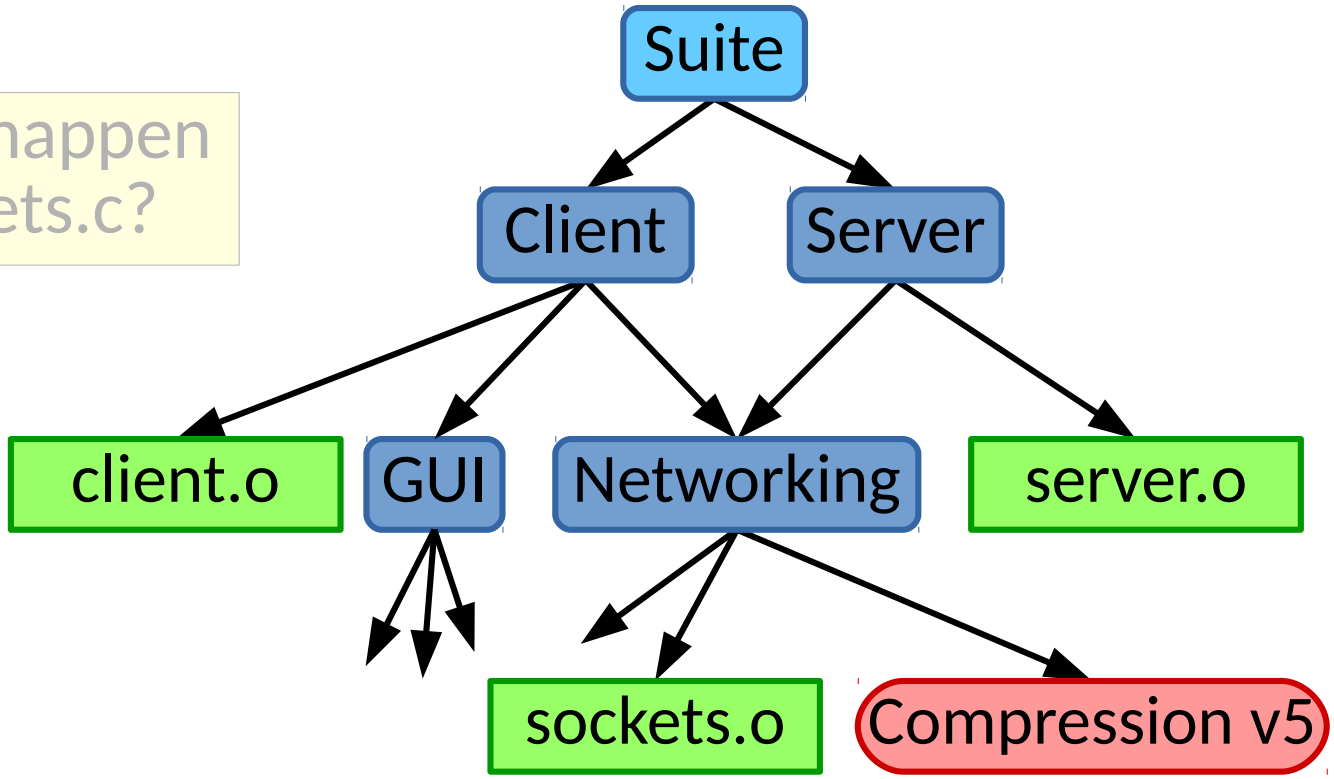

What if our project requires support for C11?

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[DEMO]

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  - Specification can clearly capture
    - Libraries, versions, & even how to download them automatically
    - Semantics of compilation & how to use in analysis tools

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Build configuration helps manage complex build processes deterministically

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  - Why is this bad?
  - May need multiple builds at once: debug, release, …
  - Pollutes version control
  - Makes clean builds complicated
- Use “out of source” builds instead

Using CMake

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- CMakeLists.txt
  - A script in every directory of your project that controls how to build “things” in that directory
- Simple syntax
  - Case insensitive commands

```
command( argument1 argument2 argument3 ...)
```

  - Let's revisit demo 1!

Targets & Commands

- CMake allows you to specify *targets*
  - Executables, libraries, “objects”

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- And *commands* that can describe how to build those targets
  - Automatic for executable & library
  - `add_custom_command()` can build others
    - Documentation
    - Media

Directories

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- Specify search paths for header files or libraries

```
include_directories(include)
link_directories(lib)
```

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- How might convenient library use affect program structure and design?
  - How might it help us begin to handle complexity?

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- Controlling where things are built

  ```
  set(CMAKE_RUNTIME_OUTPUT_DIRECTORY
      "${PROJECT_BINARY_DIR}/bin")
  set(CMAKE_LIBRARY_OUTPUT_DIRECTORY
      "${PROJECT_BINARY_DIR}/lib")
  ```

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- Installation

```
install(TARGETS target1 target2 ...
  DESTINATION /tmp/
)
```

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foreach(loop_var arg1 arg2 ...)
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- Functions

```
function(function_name arg1 arg2 ...)
  command(${arg1})
endFunction(function_name)
```

Examples

- Let's take a look at some examples....